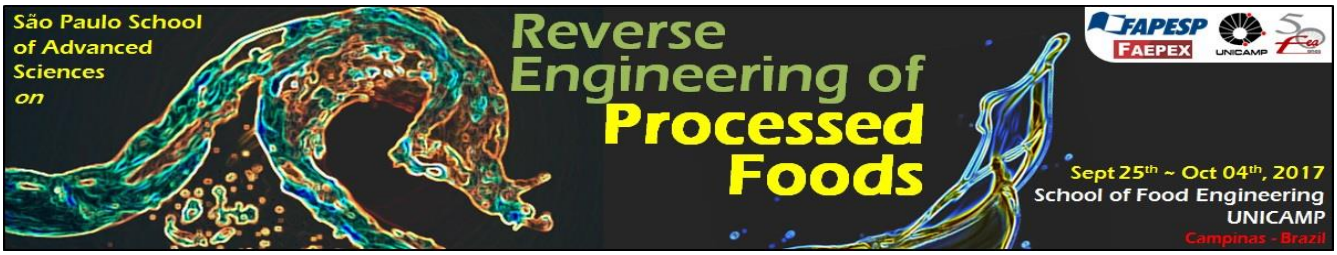

EFFECTS OF PROCESS VARIABLES ON PHYSICOCHEMICAL PROPERTIES OF BIGELS

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Bigels are complex biphasic systems composed by an organic and aqueous gelled phases that can act as texture modifiers due to their enhanced mechanical properties. Moreover, the presence of oil and water phases allow their use as vehicles for both hydrophilic and lipophilic bioactives, making them very interesting for food, cosmetics and pharmaceutical applications. Despite the increasing number of publications concerning the production and use of bigels in recent years, there are no papers evaluating the effects of process conditions on their physicochemical properties. Thus, the aim of this work was to evaluate the influence of the process variables on particle size, mechanical and rheological properties. For this purpose, gellan gum was used to produce hydrogels and high oleic sunflower oil and glycerol monostearate to produce organogels. Hydrogels and organogels were produced separately by solubilizing the correspondent gelling agent at 80 °C during 30 min. After gelation, they were

mixed in a mechanical stirrer at determined speed for 10 min. A four level (24) Central Composite Rotational Design (CCRD) configuration was applied in order to study the organogelator concentration (5 % - 15 % w/w), hydrocolloid concentration (1 % - 1.5 % w/w), organogel:hydrogel ratio (80:20 – 20:80) and shear of mixing (500 min-1 – 1500 min-1). The evaluated responses (dependent variables) were particle size distribution, complex modulus (G*) at 1 Hz and mechanical properties (spreadability, adhesiveness, firmness). Rheological results showed that all systems were frequency independent (characteristic of gelled systems) even after stirring. According to the CCRD results, mechanical and rheological properties showed the same tendency with the variation of the independent variables. The factors that most affected these parameters were the concentration of organogelator and the organogel:hydrogel ratio. The increase in glycerol monostearate concentration led to the formation of more structured gels, with high spreadability, firmness, adhesiveness and G* values. The same behavior was observed when organogel concentration prevailed in the system. On the other hand, smaller particles were obtained when higher mixing speeds were applied. Thus, Different physicochemical properties can be obtained by tuning the parameters involved in the bigels production process. Softer or harder gels, with higher or lower spreadability, bigger or smaller particles size distribution can be produced depending on the desired final product and application.